my of prose is proportional to his familiarity with the material, a suspicion confirmed by an occasional imprecision in the wordier sections. For example, in the general discussion of molecular vibrations on page 282 I found "fundamental transitions may be of two different types: *infrared* (ir) and *Raman*," although the example discussed later on page 287 does contain an inactive mode. This and other minor infelicities in Di Bartolo's book will not disturb a mature reader, but they will detract from the book's luster as a textbook.

A text should fill in the gaps between a student's cryptic lecture notes and equations, providing details, explanations and concepts missed in the rush of note taking. Di Bartolo's book does not do this and leaves such niceties to the reader's imagination, inventiveness or experience. Anyway, the volume probably would be double its present size if it did. A textbook is rarely selected, though, because students will like it, but usually because the professor likes it. And professors should be delighted with Di Bartolo's book—it is a treasure of ready-to-wear lecture material and provides for many hours of expansive comment.

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Robert Summitt is an associate professor of metallurgy, mechanics and materials science at Michigan State University.

Detailed experimental technique

PROGRESS IN NUCLEAR TECHNIQUES AND INSTRUMENTATION, VOL. 3. F. J. M. Farley, ed. 255 pp. North-Holland, Amsterdam (Interscience, New York), 1968. $13.50

by ROBERT R. BORCHERS

Volume 3 of the series *Progress in Nuclear Techniques and Instrumentation* appears to fulfill a definite need in present day research. The need is caused by the hesitancy of many authors to include technical details about experimental technique in their journal publications. Many of the important things that make experiments possible are never described outside the internal and progress reports that are not cataloged or generally available. Semiconductor detectors are a good example.

I am very often approached by students and asked for a good reference on the present state of semiconductor detector technology. Until the present volume appeared, I generally referred them to literature published by various manufacturers.

George Ewans's article on the subject of semiconductor detectors is complete and is very timely, now that the technology seems to have stabilized after the introduction of lithium-drifted germanium detectors. I have already found it very useful on several occasions, not as a reference for fabricating detectors but rather for information on obtainable performance. A somewhat more specialized article, dealing mainly with Ge(Li) gamma-ray detectors, by A. J. Tavendale appeared in volume 17 of *Annual Reviews of Nuclear Science*.

The other two articles in this volume by B. W. Montague on rf particle separation at high energies and by T. Alvager and J. Uhler on electromagnetic isotope separators are both well done. They are long enough to con-

tain a fair amount of detail and to give a picture of what can be accomplished.

It is interesting that there is probably relatively little overlap in the audiences for these three articles. This fact was true of the former volumes that are about evenly split between topics of interest in nuclear physics and those primarily for high-energy experiments. Nevertheless the series represents a worthwhile contribution to the technical literature.

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Robert R. Borchers is presently doing research in gamma-ray perturbed angular correlation and digital data-handling techniques at the University of Wisconsin, Madison.

Bell's quanta

THE PHYSICS OF LARGE DEFORMATION OF CRYSTALLINE SOLIDS, VOL. 14. By James F. Bell. 253 pp. Springer-Verlag, New York, 1968. $12.00

by DANIEL C. MATTIS

This monograph suggests an amusing and potentially unique intersection of solid-state physics and mechanical engineering. Over a span of 20 years of research, James F. Bell, professor at Johns Hopkins' solid mechanics department, has performed thousands of experiments on dozens of varied crystalline solids ranging from rock salt to aluminum. The tests, some static and some involving the motion of large-amplitude waves in the material, had durations as short as 10^{-6} sec at strain rates of 10^5 sec^{-1} and as long as 10^6 sec at strain rates of 10^{-8} sec.$^{-1}$ They were conducted at temperatures as low as 4.2 K and as high as 1800 K, that is from $T/T_m =$ 0.003 to 0.98, where T_m is the melting temperature of the material. From these experiments, which are the substance of this monograph, Bell derives the phenomenological law

$$\sigma = \left(\frac{2}{3}\right)^{r/2} \mu(0)B_0\left(1 - \frac{T}{T_m}\right)(\epsilon - \epsilon_b)^{1/2}$$

where σ is the uniaxial stress and ϵ the uniaxial strain. They are referred to an initial unstressed value ϵ_b. B_0 is a constant, $\mu(0)$ is isotropic modulus, and $r = 1,2,3, \ldots$ is a positive integer that increases by steps of unity or more, with increasing stress. Typical experimental results are shown in the figure. Not content with quantizing r, Bell has also found that $\mu(0)$ is quantized

$$\mu(0) = \left(\frac{2}{3}\right)^{s/2+p/4} \times 2.89 \times 10^4\,\text{kg/mm}^2$$

This is a universal relation for crystalline materials, in which $s = 1,2,3, \ldots$ is also an arbitrary positive integer and $p = 0,1$ is a structure factor that is constant for a given material.

Does the fraction 2/3 arise from an average, say of $\cos^2\theta$, over various orientations of microcrystalline structures? Do the "quantum numbers" r, s and p relate to the number of such microstructures? Answers based on a microscopic model are presently not available, and there are no guesses ventured in this book. The technological importance of understanding large-scale deformation of matter is obvious, and so the challenge of this book to physicists is loud and clear.

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The reviewer is professor of solid-state physics at the Belfer Graduate School of Science of Yeshiva University, and has most recently coauthored an article "Magnetic Semiconductors," in the Handbuch der Physik.

Compound semiconductors

MONOGRAPHS IN SEMICONDUCTOR PHYSICS, VOL. 2: LIQUID SEMICONDUCTORS. (Trans. from Russian) By V. M. Glazov, S. N. Chizhevskaya, N. N. Glagoleva. 362 pp. Plenum, New York, 1969. $22.50

by STUART A. RICE

Although the translation from the Russian is undoubtedly correct, the title of this book is misleading. To me the interesting problems in liquid semiconductors are primarily concerned with the electronic structure, the scattering processes that occur in liquids and the relation between the optical spectra of liquids and solids.

This book, on the other hand, describes thermodynamic and gross physical properties of semiconductors. It is, in fact, an extended review of the authors' work and of similar work by other investigators. The dc conductivities, the thermoelectric powers, the magnetic susceptibilities and oc-